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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No. : 09/844,533
Applicants : Tatsuhito TAKAHASHI et al.
Filed : April 27, 2001
For : UNDER WATER IMMERSION BLOCK
AND METHOD TO PRODUCE THE SAME
Art Unit : 1755
Examiner : Paul D. Marcantoni
Docket No. : 01254C/HG
Confirmation No. : 3735
Customer No. : 01933

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SIR:

The undersigned declares as follows:

1. I am a coinventor of the above-identified patent application.

2. I graduated from the University of Tokyo Institute of Technology in the year 1976, and I received the degree of Bachelor. I received the degree of Doctor in engineering from Tokyo Institute of Technology in the year 1996.

3. I have worked for NKK CORPORATION (now JFE Steel Corporation), Tokyo, Japan, since 1976, and I presently hold the position of staff general manager.

4. The following experiments, which show unexpected results for the presently claimed invention, were carried out under my supervision.

An explanation of each photo

PHOTO A: REACTION MECHANISM AND THE MICROSTRUCTURE

This photo discloses one of advantageous technical specific features of the present invention. On the left part of the photo, the concerned model is drawn, which means, the reaction mechanism of the present invention. On the right part of the photo, the corresponding microstructure is attached, which means, a state of the combination of calcium carbonate and the slag in a shape of the network.

That is, a method for preparing agglomerates of solid particles containing at least one compound selected from the group consisting of CaO and Ca(OH)_2 , contacting an exhaust gas containing CO_2 with the agglomerates of the solid particles in a reaction chamber, the solid particles having a film of adhesive water on a surface of the solid particles, fixing CO_2 in the exhaust gas as CaCO_3 to reduce CO_2 in the exhaust gas. (page 10, line 6 from the bottom, to page 11, line 5 from the top. of Specification in the present invention.) This film of adhesive water on a surface of the solid particles makes it easy to accelerate carbonation rapidly. This is one more great advantage of the present invention, focusing on the carbonation itself. As a result, the rapid growth of algae can be obtained in the present invention, compared with the cited prior arts.

PHOTO B: ADHERING PROPERTY AND REARING PROPERTY TO SLAG BLOCK (JYOGASHIMA)

This photo discloses how much degree the marine blocks in the present invention bring up the unexpected results, compared with the concrete block. On the left part of this photo, two sorts of pictures are followed up, which is, concerning the comparison of the adhering and rearing on the block. The observation was obtained when 7 months passed after immersing both of the marine block and the concrete block. Watching these two pictures, it is easily found out that the marine block of the present invention has a big deal of effectiveness, concerning the growth of algae. On the right part of the photo, the comparison between the number of *Ecklonia* on the top face of the block among the marine block of the present invention, the concrete block and the natural reef. The graph shows that the marine block of the present invention

is the best block to obtain a great deal of the number of Ecklonia.

PHOTOS C: MARINE BLOCK IMMERSION TEST (Okinawa)

The photo shows that the marine block of the present invention obtains a good result of the adhering coral. Test area is Okinawa. The left part of the photo shows that a lot of amount of the adhering coral is observed compared with the immersion time. The photo on the upper part of the left side displays a state of the marine immersion block when the block was immersed. And the photo on the lower part of the left side displays how much degree the coral adhered to the marine block. The community made of 40 polyp was obtained. The right part of the photo is the comparison table about the number of the adhering coral, between the marine block and the concrete block.

PHOTO D: ENVIRONMENTAL IMPROVEMENT BY MARINE BLOCK

This photo shows one example of the construction structure by using the marine block in the sea. These photos were taken by Hiroshima Prefecture in Japan. On the right part of the photo shows that a various algae, which are Padina, Codium, Asparagopsis and Sargassum are breeding up.

PHOTO E: THE OBSERVED RESULT OF MARINE BLOCK IMMERSION TESTING IN THE ACTUAL SEA AREA (Jogashima)

This photo shows that the top surface of the marine block obtains much more amount of the growing algae adhered to the marine block, compared with the top surface of the concrete block. This photo was taken when the 7 months passed after the block was immersed into the actual sea area.

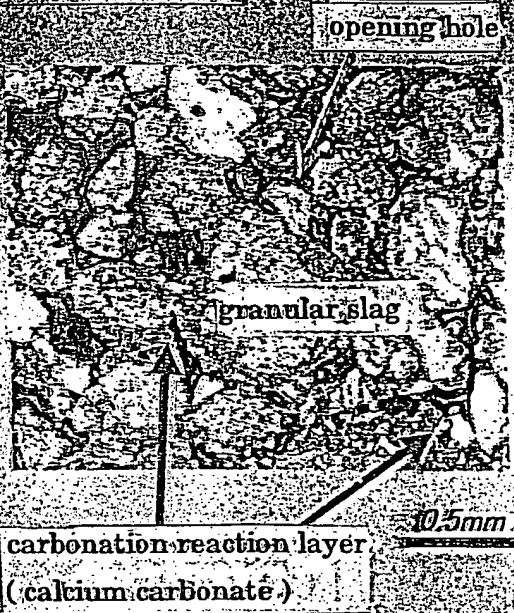
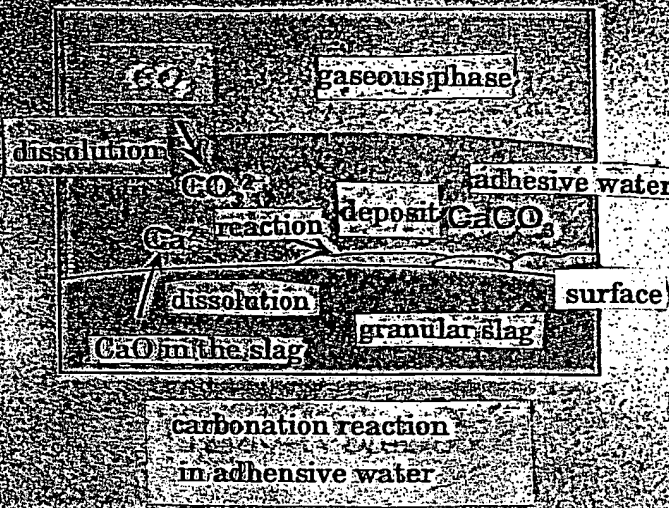
I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true ; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment , or both , under Section 1001 , of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon .

Date: February 4, 2004 By: Tatsuhito Takahashi
Name: Tatsuhito Takahashi

OTPE
FEB 0 8 2004

PHOTO A

REACTION MECHANISM AND THE MICROSTRUCTURE



Calcium carbonate combines the slag in a shape of the network

FEB 0 - 2004

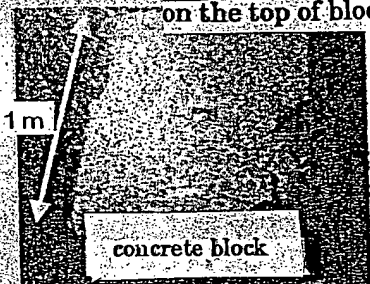
PHOTO B

ADHERING PROPERTY AND REARING PROPERTY TO SLAG BLOCK (JYOGASHIMA)



comparison of the adhering
and rearing on the block
(7 months after immersion)

1m×1m×1mブロック上面
on the top of block



Ecklonia growth

Large-sized sea algae rearing in a short period

The number of Ecklonia on the top face of the block
when half a year has passed after immersion

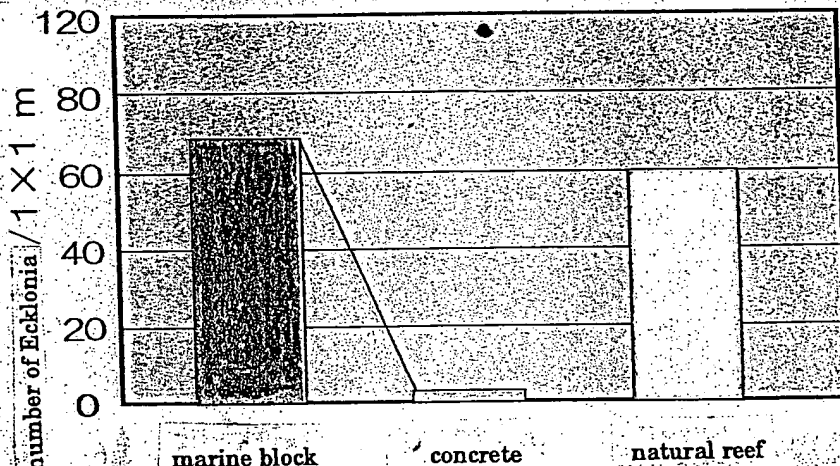


PHOTO C

Marine block immersion test (Okinawa)



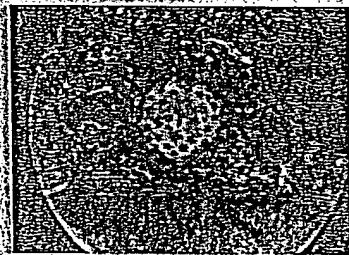
Test sea area : 4 sea area around Okinawa Pref. Immersion and observation time :



State of the immersion



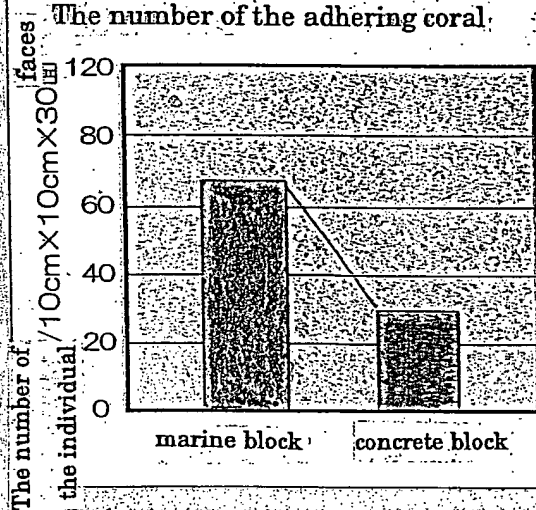
Kerama Islands



Coral adhering to the Marine block community made of 40 polyp(on October)

Testing results:

The adhering coral twice the amount of the adhering coral



Testing sample : 3 sets of testing samples / sea area

fixing the marine blocks (5 pieces of 10cm square panel) with 5 pieces of the concrete alternatively



PHOTO D

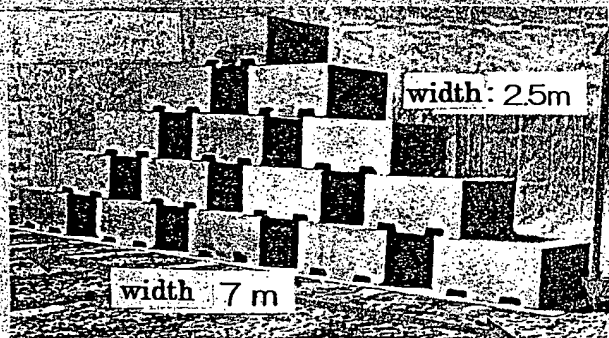
ENVIRONMENTAL IMPROVEMENT BY MARINE BLOCK



1mX1mX0.5m^H 15 pieces

MARINE BLOCK PYRAMID

13 months passing
after immersion

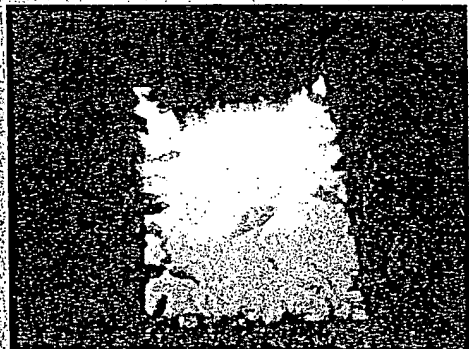


Padina,

Codium

Asparagopsis

Hiroshima Pref.



Sargassum

THE OBSERVED RESULT OF MARIN BLOCK IMMERSION TESTING
IN THE ACTUAL SEA AREA (Jyogashima)

PHOTO E

top surface of marine block

top surface of concrete block

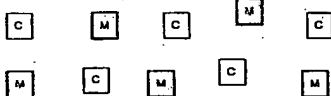
7 months passing
after immersion

depth of water 7m

1m×1m×1m

natural seaweed bed

wall face of rocky reef
depth of water 7m



M : marine block
C : concrete block

